



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/694,191	10/27/2003	Gary E. Oberlin	DP-310312	3876

7590 08/05/2005

STEFAN V. CHMIELEWSKI
DELPHI TECHNOLOGIES, INC.
Legal Staff MC CT10C
P.O. Box 9005
Kokomo, IN 46904-9005

EXAMINER

VORTMAN, ANATOLY

ART UNIT	PAPER NUMBER
----------	--------------

2835

DATE MAILED: 08/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

5/1

Office Action Summary	Application No. 10/694,191	Applicant(s) OBERLIN ET AL.	
	Examiner Anatoly Vortman	Art Unit 2835	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 13, 15, 17-22 and 30-35 is/are rejected.
- 7) ☒ Claim(s) 6-12, 14, 16 and 23-29 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>10/27/03 & 2/22/05</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 20 is rejected under 35 U.S.C. 102(b) as being anticipated by US/5,339,214 to Nelson.

Regarding claim 20, Nelson disclosed (Fig. 1-3) an electronic assembly, comprising: a high current circuit board (26); a first electronic device (30) supported by said circuit board (26) and having a first, second and third surface; a heat conductive case (12) having a first (14) and second portion (a cover, column 2, line 34) adjacent opposite sides of said circuit board (26); and a first heat pipe (38) having a first segment thermally coupled with said first surface of said first electronic device (30) (Fig. 3) and a second segment thermally coupled with said first case portion (14).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2835

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-5, 13, 15, 18, 19, 21, 22 and 30-35, are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson ('214) in view of US/6,703,128 to Myers et al., (Myers) (cited on IDS).

Regarding claims 1, 2, and 19, Nelson disclosed (Fig. 1-3) an electronic assembly, comprising a substrate (26), an electronic device (30) having a first, second and third surface, said electronic device (30) supported by said substrate (26), a heat pipe (38) for removing non-transient thermal energy, said heat pipe (38) having a first and second segment, said first segment thermally coupled with said first surface of said electronic device (30) (Fig. 3), but did not disclose a thermal transient suppression material thermally coupled with said first segment of said heat pipe and at least said second surface of said electronic device, said material having a component capable of absorbing thermal energy by phase change from a solid to a liquid and said material being self contained.

Regarding claims 21 and 22, Nelson disclosed all, but a thermal transient suppression material thermally coupled with said first segment of said heat pipe and at least said second surface of said electronic device and having sufficient thermal capacity to absorb heat generated by transient thermal events.

Myers disclosed (Fig. 1-4) a thermal transient suppression material thermally coupled with a surface of the electronic device (42), said thermal transient suppression material has sufficient thermal capacity to absorb heat generated by transient thermal events (column 1, lines

Art Unit: 2835

10-17), said material having a component capable of absorbing thermal energy by phase change from a solid to a liquid and said material being self contained (column 3, lines 6-14).

It would have been obvious to a person of ordinary skill in the cooling art at the time the invention was made to supplement electronic assembly of Nelson with a thermal transient suppression material thermally coupled with the heat pipe and the surface of the electronic device, as taught by Myers in order to absorb heat generated by transient thermal events.

Regarding claims 3-5 and 31, Nelson disclosed (Fig. 1) a heat dissipation device (34) thermally coupled with the second portion of said heat pipe (38), said heat dissipation device (34) is a heat sink having fins (36).

Regarding claim 13, Nelson disclosed (Fig. 2) a thermally conductive coupling member (46) coupling said first surface of said electronic device (30) and said first segment of said heat pipe (38).

Regarding claim 15, Nelson disclosed (Fig. 2) that said first segment of said heat pipe (38) is formed to conform to the shape of said first surface of said electronic device.

Regarding claims 18 and 32, Nelson in view of Mayers disclosed all, but a second heat pipe.

It would have been obvious to a person of ordinary skill in the cooling art at the time the invention was made to provide a second heat pipe for the assembly of Mayers in order to augment the rate of the heat exchange, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

Art Unit: 2835

Regarding claim 30, said electronic device (30) taught by Nelson-Mayers combination is inherently includes electrically conductive leads (for connection to the circuit board (26)), hence said thermal transient suppression material of Mayers would be inherently thermally coupled to said leads.

Regarding claims 33-35, the method steps recited in the claims are inherently necessitated by the device structure as taught by Nelson in view of Mayers.

5. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson in view of Mayers as applied to claim 2 above, and further in view of US/4,047,198 to Sekhon et al., (Sekhon).

Regarding claim 17, Nelson in view of Mayers disclosed all, but that the heat pipe includes a porous interior layer.

Sekhon disclosed (Fig. 2) a heat pipe (30) having a porous interior layer (32) for transporting a working fluid by capillary flow without the use of mechanical pumps (column 5, lines 34-41).

It would have been obvious to a person of ordinary skill in the cooling art at the time the invention was made to provide said heat pipe of Nelson-Mayers combination with a porous interior layer as taught by Sekhon for transporting a working fluid by capillary flow so as to eliminate mechanical pumps and to simplify the design.

6. Alternatively, claims 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over DE/4106185 (cited on IDS) in view of Myers ('128).

Regarding claims 33-35, DE/4106185 disclosed (Fig. 1A) a method of conducting heat away from an electronic device (2), comprising the steps of: thermally coupling a heat pipe (4) between the electronic device (2) and a heat sink (3); mounting the electronic device (2) on a substrate (1); coupling the substrate (1) to the heat sink (3) (via heat pipe (4)); providing a compressible material (5) between the heat pipe and the electronic device (2); and shaping a portion of the heat pipe (4) to provide improved thermal coupling with the electronic device (2) (Fig. 1B), but did not disclose a step of coupling a thermal transient suppression material to the electronic device and the heat pipe.

Myers disclosed (Fig. 1-4) a thermal transient suppression material thermally coupled with a surface of the electronic device (42), said thermal transient suppression material has sufficient thermal capacity to absorb heat generated by transient thermal events (column 1, lines 10-17), said material having a component capable of absorbing thermal energy by phase change from a solid to a liquid and said material being self contained (column 3, lines 6-14).

It would have been obvious to a person of ordinary skill in the cooling art at the time the invention was made to supplement the method of conducting heat away from an electronic device taught by DE/4106185 with a step of coupling thermal transient suppression material to the heat pipe and the surface of the electronic device, as taught by Myers in order to absorb heat generated by transient thermal events.

Allowable Subject Matter

Art Unit: 2835

7. Claims 6-12, 14, 16, and 23-29, are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter:

regarding claims 6-12, parent claim 6 recites: “an elastomeric spring compressed between said first case portion and said first segment of said heat pipe”;

regarding claim 14, the claim recites: “an aperture...said conductive coupling member protrudes through said aperture”;

regarding claim 16, the claim recites: “an external flattened portion”;

regarding claims 23-29, the parent claim 23 recites: “second case portion is in thermal contact with said third surface of said electronic device”.

The aforementioned limitations in combination with all remaining limitations of the respective claims are believed to render the claims patentable over the art of record.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure:

US/6744640, 6084178, and 5206792 disclosed electronic packages with enhanced thermal dissipation;

US/3613778 disclosed a heat pipe containing porous material (wick);

Art Unit: 2835

US/5007478 and 5224356 disclosed cooling arrangements for electronic devices utilizing heat energy absorbing materials;

US/5851338 disclosed an article with energy absorbing phase change material; and,

US/6665187, 5095404, 5847925, 6038128, 6043980, 6082443, 6212074, 6269866, and 6813153 disclosed cooling arrangements for electronic devices utilizing heat pipes.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anatoly Vortman whose telephone number is 571-272-2047. The examiner can normally be reached on Monday-Friday, between 10:00 am and 6:30 pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ms. Lynn Feild can be reached on 571-272-2092. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Anatoly Vortman
Primary Examiner
Art Unit 2835

AV

